

Australian Standard™

Railway track material

Part 2: Fishplates

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Australasian Railway Association
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Australian Industry Group
Bureau of Steel Manufactures of Australia
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Australian Standard™

Railway track material

Part 2: Fishplates

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PREFACE

This Standard was prepared by the Standards Australia Committee CE-002, Railway Track Materials, to supersede AS 1085.2—1993 *Railway permanent way material Part 2: Fishplates*.

The objective of this Standard is to provide purchasers and suppliers, including owners, operators, designers and manufacturers of railway rail with requirements for fishplates for use with rails in accordance with AS 1085.1 in railway track.

Changes to the previous edition are as follows:

- (a) Change of title of the AS 1085 series (previously *Railway permanent way material*).
- (b) The referenced documents list has been revised.
- (c) Reference to the withdrawn Standards AS 1213 and K1 have been removed.
- (d) The most recent version of the informative Appendix 'Means of demonstrating compliance with this Standard' has been included.

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STANDARDS AUSTRALIA

**Australian Standard
Railway track material****Part 2: Fishplates****1 SCOPE**

This Standard specifies requirements for bar-type steel fishplates for use in conjunction with steel rails rolled in accordance with AS 1085.1.

NOTES:

- 1 Purchasing guidelines are given in Appendix A.
- 2 Profiles and properties for fishplates are given in Appendix B.
- 3 Means of demonstrating compliance with this Standard are given in Appendix C.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1085	Railway track material
1085.1	Part 1: Steel rails
1199	Sampling procedures and tables for inspection by attributes
1391	Methods for tensile testing of metals
1399	Guide to AS 1199—Sampling procedures and tables for inspection by attributes
1442	Carbon steels and carbon-manganese steels—Hot-rolled bars and semifinished products
1448	Carbon steels and carbon-manganese steels—Forgings (ruling section 300 mm maximum)
2706	Numerical values—Rounding and interpretation of limiting values
4291	Mechanical properties of fasteners made of carbon steel and alloy steel
4291.1	Part 1: Bolts, screws and studs
AS/NZS	
1050	Methods for the analysis of iron and steel (all methods)
ISO 9001	Quality management systems—Requirements
ISO 9004	Quality management systems—Guidelines for performance improvements
SAI	
HB 18	Guidelines for third-party certification and accreditation
HB 18.28	Guide 28—General rules for a model third-party certification scheme for products

3 DESIGNATION

Fishplates shall be designated by the number of this Australian Standard and the nominal rail size.

Example:

Fishplate in accordance with AS 1085.2 for 50 kg rail.

4 STEEL-MAKING PROCESS

The steel used for the manufacture of the fishplates shall comply with AS 1442 or AS 1448, and shall meet all the requirements of this Standard.

5 BRANDS

Each fishplate shall be distinctly branded with figures denoting the mass per metre of rails for which it is intended, and a mark to identify the manufacturer and the year in which it was rolled or forged, e.g., 50XXX03.

The letters and figures shall be rolled or forged on the outside surface of the fishplate, and shall be raised not less than 0.5 mm from the plane surface of the fishplate.

NOTES:

- 1 The year of manufacture is to be used for the purpose of identification only and should not be used as a basis for rejection of the fishplates.
- 2 Manufacturers making a statement of compliance with this Australian Standard on a product, packaging, or promotional material related to that product are advised to ensure that such compliance is capable of being verified.

6 CHEMICAL COMPOSITION

6.1 General

The chemical composition shall be determined by cast analysis. Sampling, preparation and testing shall be by any procedures that are not less accurate than those in AS/NZS 1050.

6.2 Cast analysis

Separate analyses shall be made from samples representing ingots from the first one-third of the heat and ingots from the last one-third of the heat, or one sample from each ladle of the heat if the heat is continuously cast.

6.3 Composition

The cast analysis of the steel (see Clause 6.2) shall conform to the limits of chemical composition given in Table 1.

TABLE 1
CHEMICAL COMPOSITION (CAST ANALYSIS)

Analysis, %									
Carbon		Silicon		Manganese		Phosphorus		Sulfur	
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
0.35	0.55	—	0.35	0.55	1.00	—	0.05	—	0.05

7 HOLES FOR FISHBOLTS

The holes for fishbolts shall be either drilled or punched, and shall be to the centres and dimensions shown in the appropriate drawing in Appendix B, subject to the tolerances given in Table 2.

NOTE: This requirement does not preclude the negotiation between the manufacturer and purchaser of dimensions and tolerances of holes and hole centres other than those specified herein.

8 FINISH

Fishplates shall be free from defects detrimental to their end use. Localized areas of deformation caused by shearing or punching and conforming to the tolerance limits given in Table 2 shall be permitted.

9 TOLERANCES ON SECTION AND DIMENSIONS

9.1 Section

The section shall conform to the appropriate profile given in Appendix B. A variation of 2.0 mm horizontally outwards shall be permitted, that is, if a fishplate template is placed on the rolled bar or forging, it shall not vary horizontally outwards by more than 2.0 mm from the nominal position.

9.2 Dimensions

Fishplates shall conform to the dimensions indicated for the appropriate profile given in Appendix B, subject to the tolerances given in Table 2.

10 CALCULATED MASS PER PAIR OF FISHPLATES

Calculated mass values per pair of fishplates (unpunched) are set out in Table 3.

NOTE: These are theoretical values based on nominal dimensions.

11 MECHANICAL PROPERTIES

The mechanical properties of test pieces sampled and tested in accordance with Clause 12 shall comply with the limits given in Table 4.

12 TENSILE STRENGTH

12.1 General

Samples for tensile testing shall be selected from any two fishplates or fishplate bars representative of each heat of steel.

It shall be permissible to discard a test piece that shows defective rolling, forging or develops flaws, and to submit another test piece.

TABLE 2
DIMENSIONAL TOLERANCES

Characteristic	Tolerance mm	
	Length	±3.0
Thickness	+3.0, -0.5	
Size of hole	±1.0	
Position of holes	±1.0	
Localized areas of deformation on the fishing surfaces	+0.5, -1.0	
All other dimensions	±1.0	
Camber—	Fishplates ≤650 long	Fishplates >650 long
centre upwards	1.0	2.0
centre downwards	1.0	2.0
centre outwards from rail	1.0	2.0
centre inwards from rail	1.0	2.0

TABLE 3
CALCULATED MASS PER PAIR OF FISHPLATES (UNPUNCHED)

Nominal rail size kg/m	Mass, kg	
	4-hole	6-hole
31	14.5	21.8
41, 47	22.6	33.8
50	—	34.4
53	23.7	35.5
60	—	39.7

TABLE 4
MECHANICAL PROPERTIES

Property	Value
Tensile strength, MPa	550 to 740
Elongation on $5.65\sqrt{S_0}$ *, % min.	13

* Gauge length as defined in AS/NZS 4291.1.

*AS 1442 30 1045
570 - 700 MPa
14 - 30%*

Yield = 300-350 MPa

12.2 Tensile test pieces

Test pieces shall be circular-section proportional test pieces of 150 mm² cross-sectional area, prepared and tested in accordance with AS 1391.

If a test piece breaks outside the middle third of its gauge length, resulting in an elongation below the specified value, the test may, at the manufacturer's option, be discarded and another test piece made from the same test sample.

13 RETESTS

Should either of the test pieces fail to comply with the specified requirements, two further samples shall be taken and tested in accordance with this Standard. Should the test pieces from both of these further samples pass, the parcel shall be deemed to comply with this Standard. If either of the additional test pieces fails, the parcel shall be deemed not to comply with this Standard.

14 ROUNDING OF NUMBERS

For the purpose of assessing compliance with this Standard, the specified limiting values herein shall be interpreted in accordance with the 'rounding method' described in AS 2706, that is, the observed or calculated value shall be rounded to the same number of figures as in the specified or calculated value and then compared with the specified limiting values. For example, for specified limiting values of 2.5, 2.50 and 2.500, the observed or calculated value would be rounded respectively to the nearest 0.1, 0.01 and 0.001.

APPENDIX A
INFORMATION TO BE SUPPLIED THE BY PURCHASER

(Informative)

The following information should be supplied by the purchaser:

- (a) Designation of the fishplate (see Clause 3) including the number of this Australian Standard, i.e., AS 1085.2.
- (b) The nominal rail size (e.g. 50 kg) with which the fishplates are intended to be used or the number of the appropriate drawing, or both.
- (c) Quantity (mass or number of pairs).
- (d) The number and diameter of holes.
- (e) Whether a test certificate is required.
- (f) Whether it is the intention of the purchaser to inspect the material at the manufacturer's works.
- (g) Any exceptions to the requirements specified, and any special or supplementary requirements.

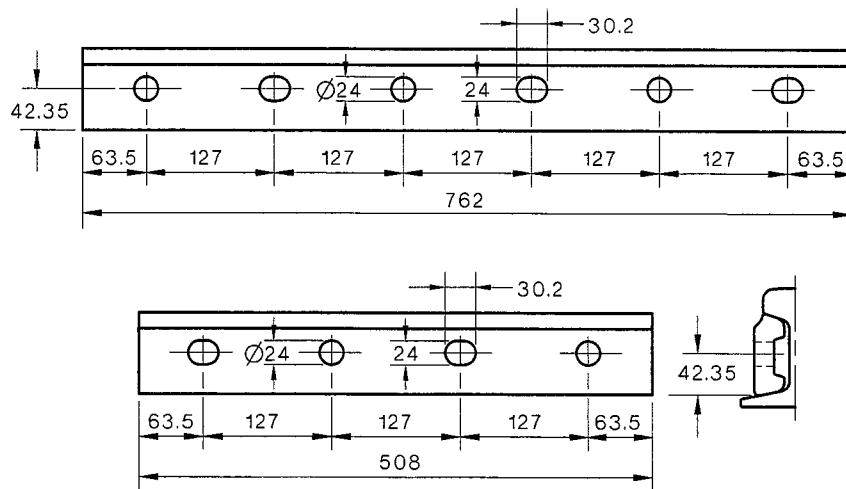
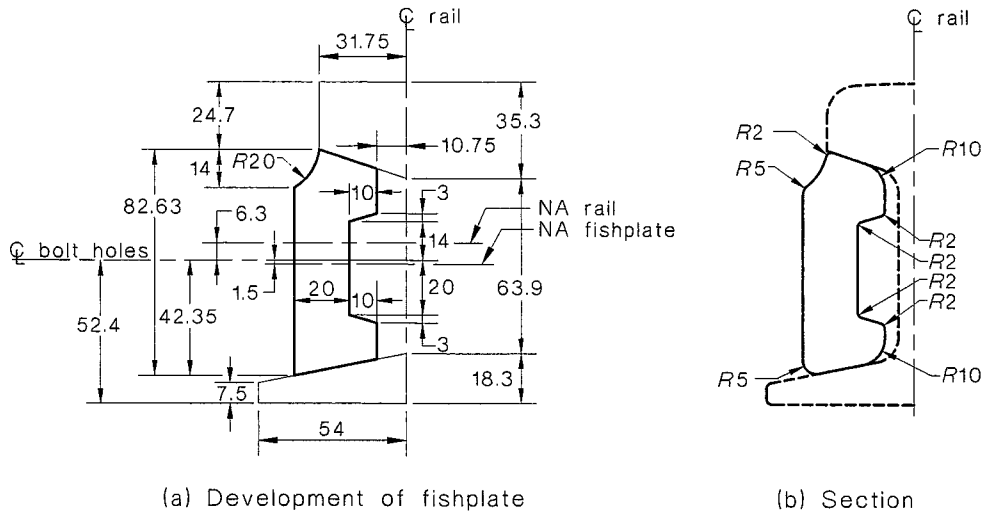
APPENDIX B

FISHPLATE PROFILES, SECTION PROPERTIES AND PUNCHING DETAILS

(Normative)

B1 SCOPE

This Appendix provides profile details, section properties and punching details for rolled and forged bar-type fishplates.

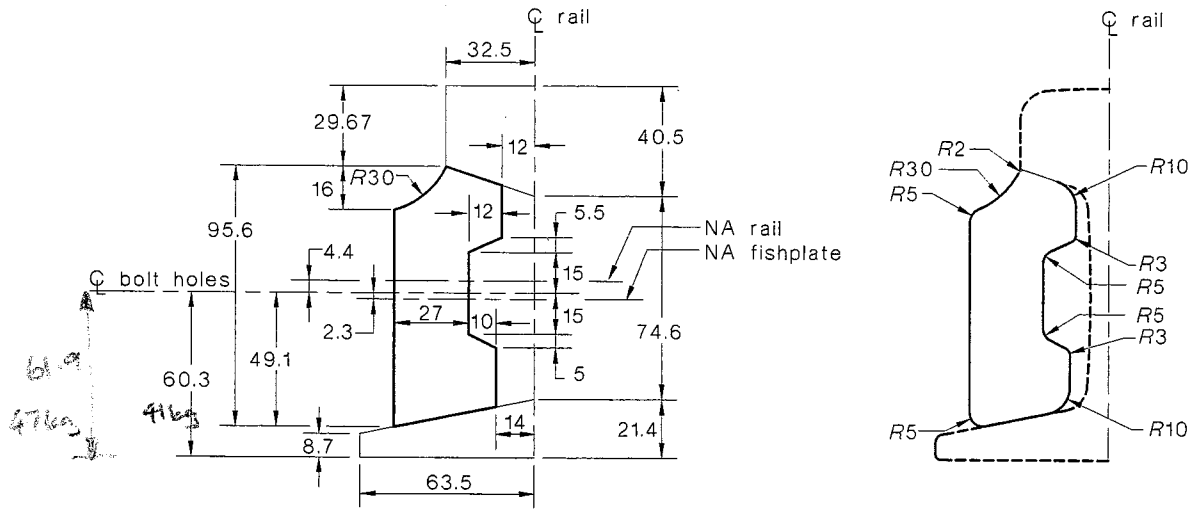


(c) Punching details

Area	1823 mm ²
Unit mass	14.3 kg/m
Second moment of area	0.97 × 10 ⁶ mm ⁴
Section modulus head	23.5 × 10 ³ mm ³
Section modulus base	24.6 × 10 ³ mm ³

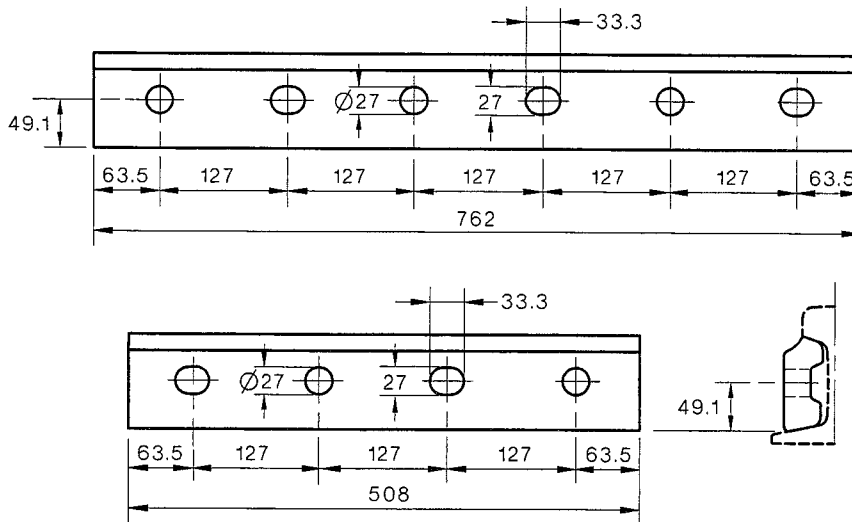
DIMENSIONS IN MILLIMETRES

FIGURE B1 SECTION AND PUNCHING DETAILS OF BAR-TYPE (ROLLED) FISHPLATE FOR 31 kg/m RAIL



(a) Development of fishplate

(b) Section

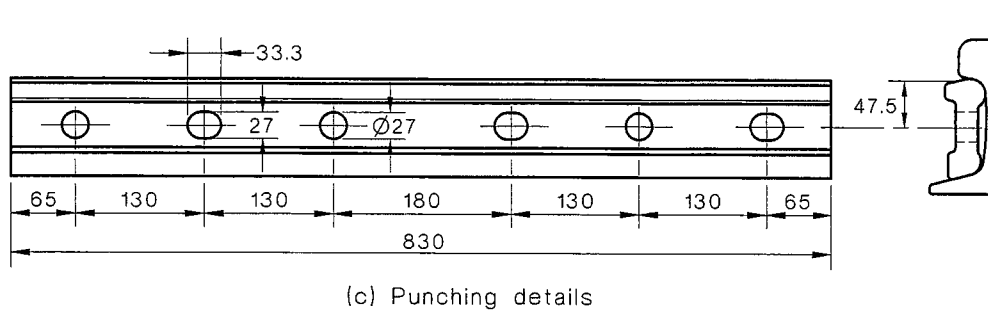
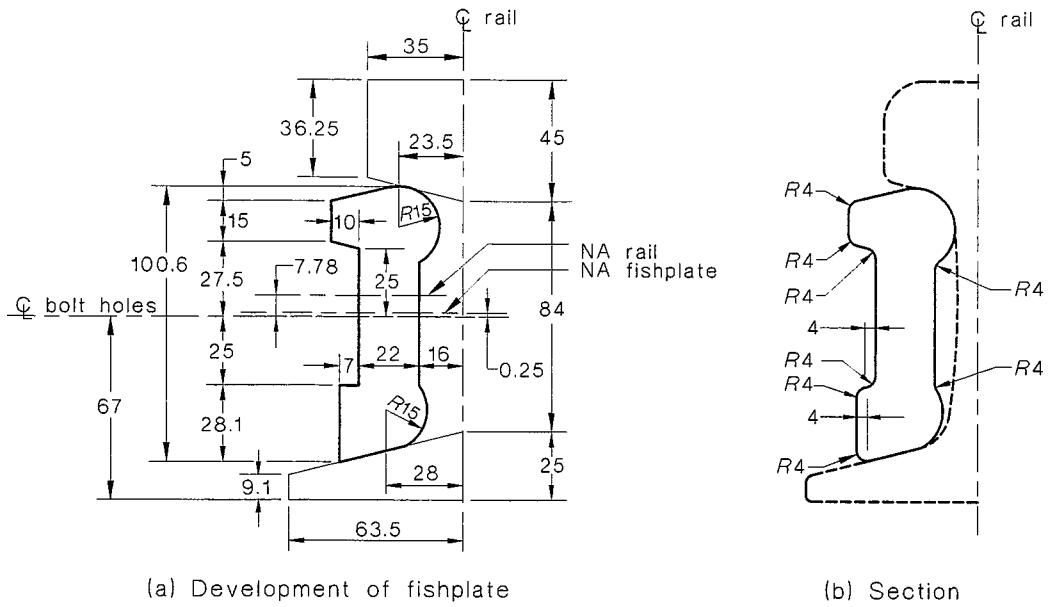


(c) Punching details

Area	2823 mm ²
Unit mass	22.2 kg/m
Second moment of area	$2.03 \times 10^6 \text{ mm}^4$
Section modulus head	$41.9 \times 10^3 \text{ mm}^3$
Section modulus base	$44.4 \times 10^3 \text{ mm}^3$

DIMENSIONS IN MILLIMETRES

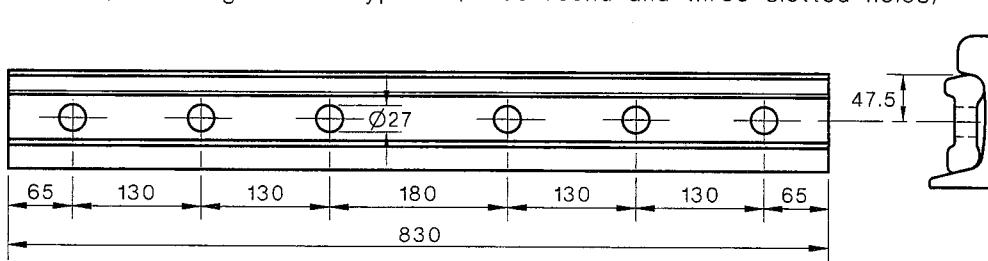
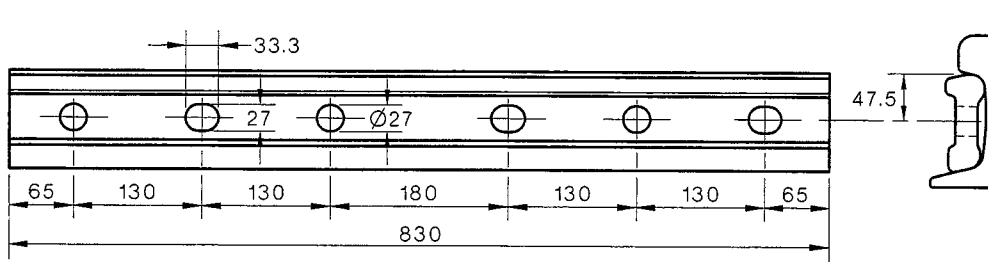
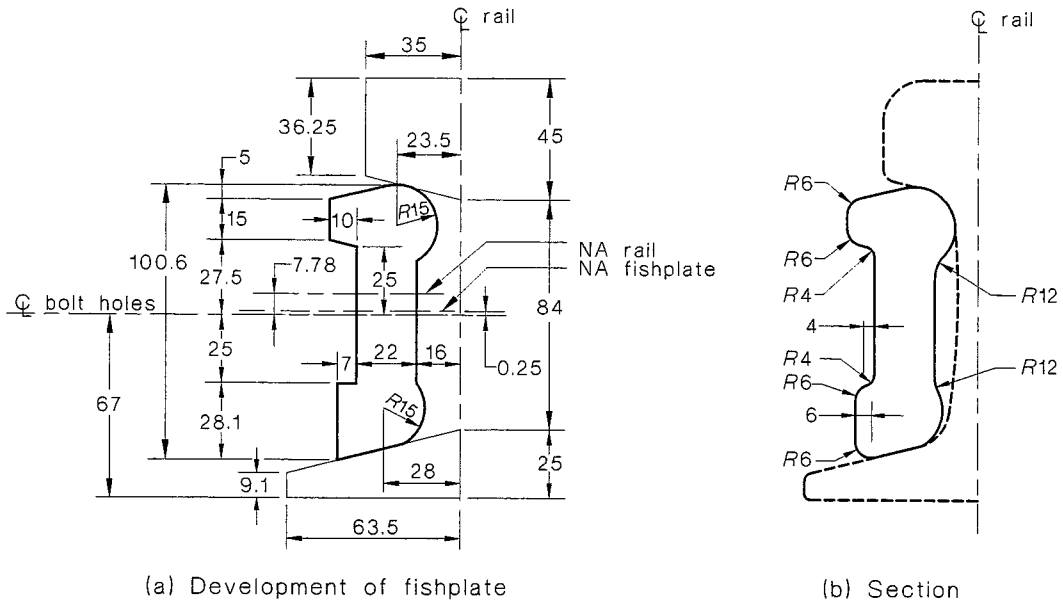
FIGURE B2 SECTION AND PUNCHING DETAILS OF BAR-TYPE (ROLLED) FISHPLATE FOR 41 kg/m AND 47 kg/m RAIL



Area	2639 mm ²
Unit mass	20.7 kg/m
Second moment of area	$2.29 \times 10^6 \text{ mm}^4$
Section modulus head	$48.14 \times 10^3 \text{ mm}^3$
Section modulus base	$43.77 \times 10^3 \text{ mm}^3$

DIMENSIONS IN MILLIMETRES

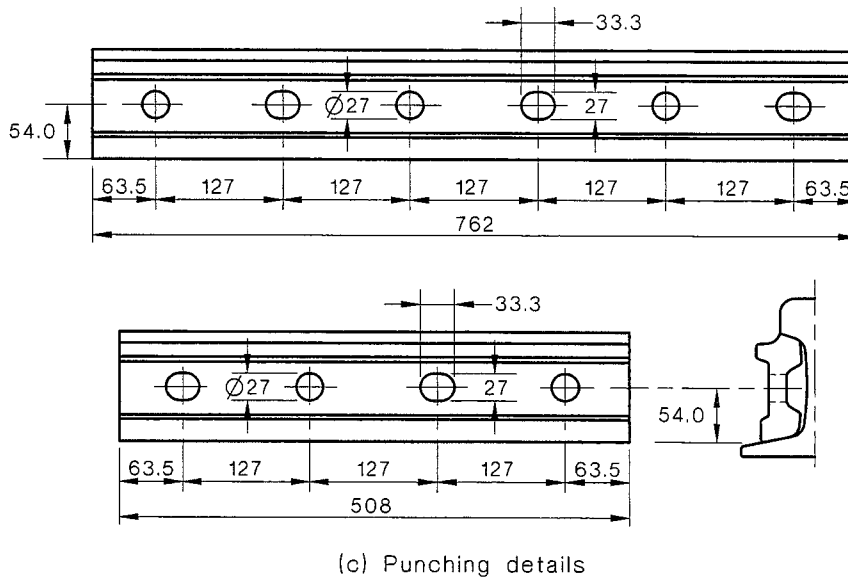
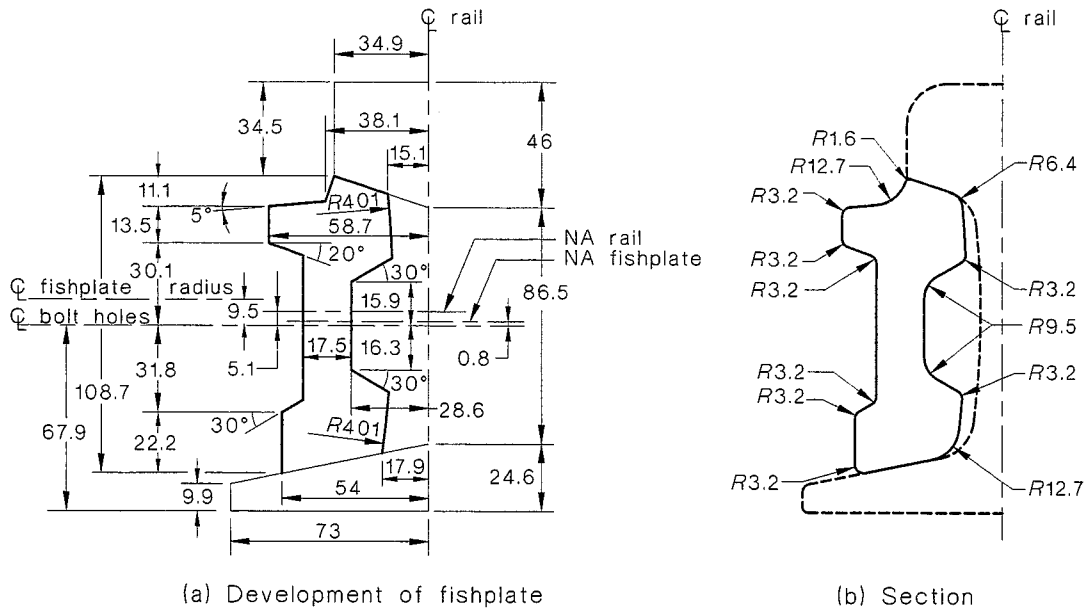
FIGURE B3 SECTION AND PUNCHING DETAILS OF BAR-TYPE (ROLLED) FISHPLATE FOR 50 kg/m RAIL



Area	2639 mm ²
Unit mass	20.7 kg/m
Second moment of area	2.29×10^6 mm ⁴
Section modulus head	48.14×10^3 mm ³
Section modulus base	43.77×10^3 mm ³

DIMENSIONS IN MILLIMETRES

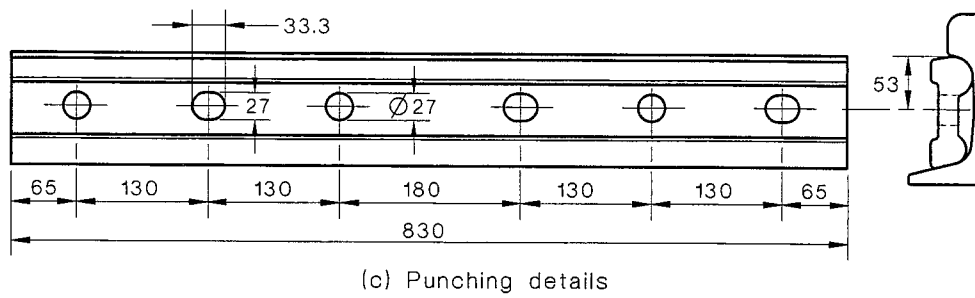
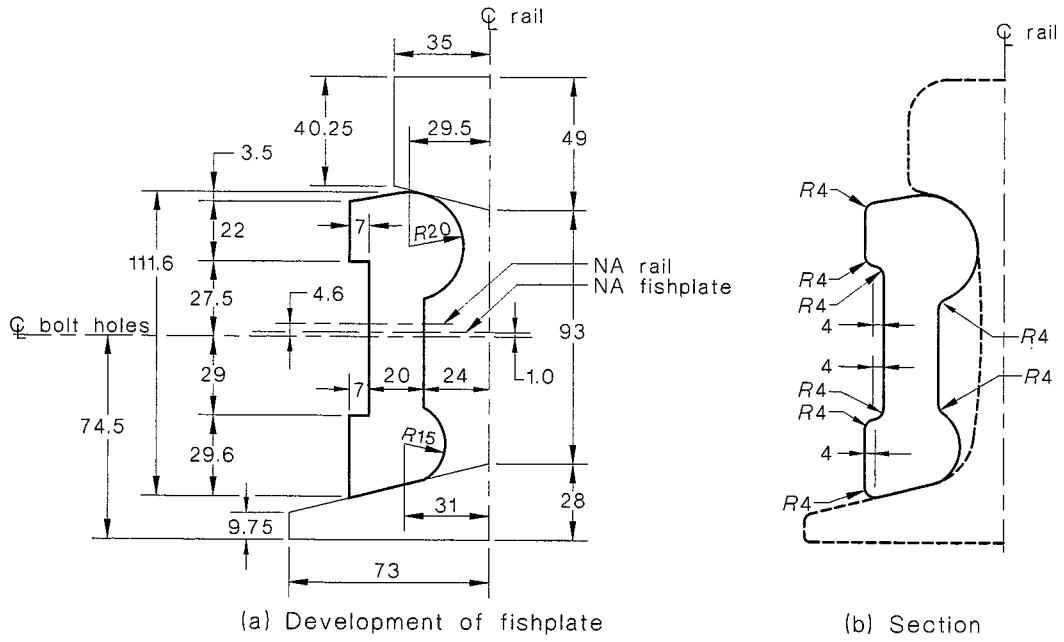
FIGURE B4 SECTION AND PUNCHING DETAILS OF BAR-TYPE (FORGED) FISHPLATE FOR 50 kg/m RAIL



Area	2968 mm ²
Unit mass	23.30 kg/m
Second moment of area	3.14 × 10 ⁶ mm ⁴
Section modulus head	59.00 × 10 ³ mm ³
Section modulus base	57.20 × 10 ³ mm ³

DIMENSIONS IN MILLIMETRES

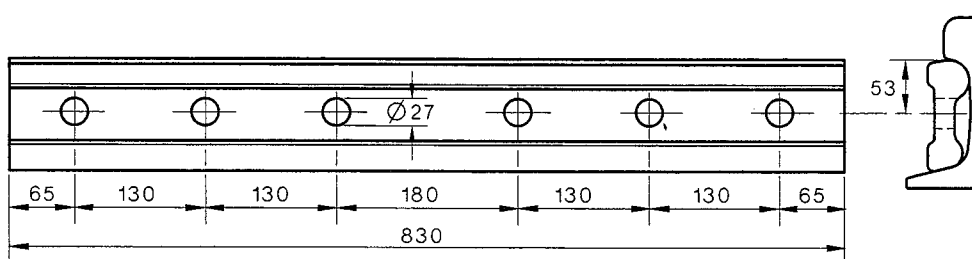
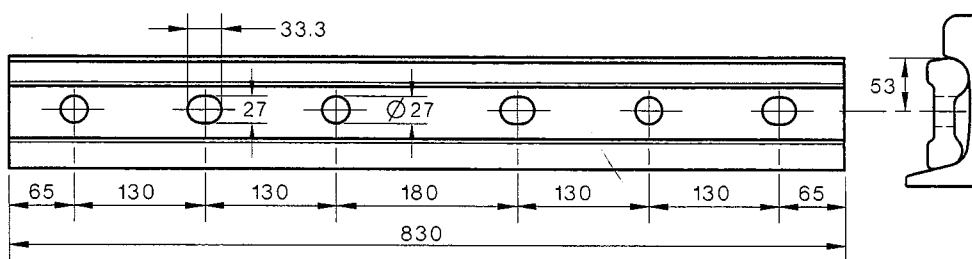
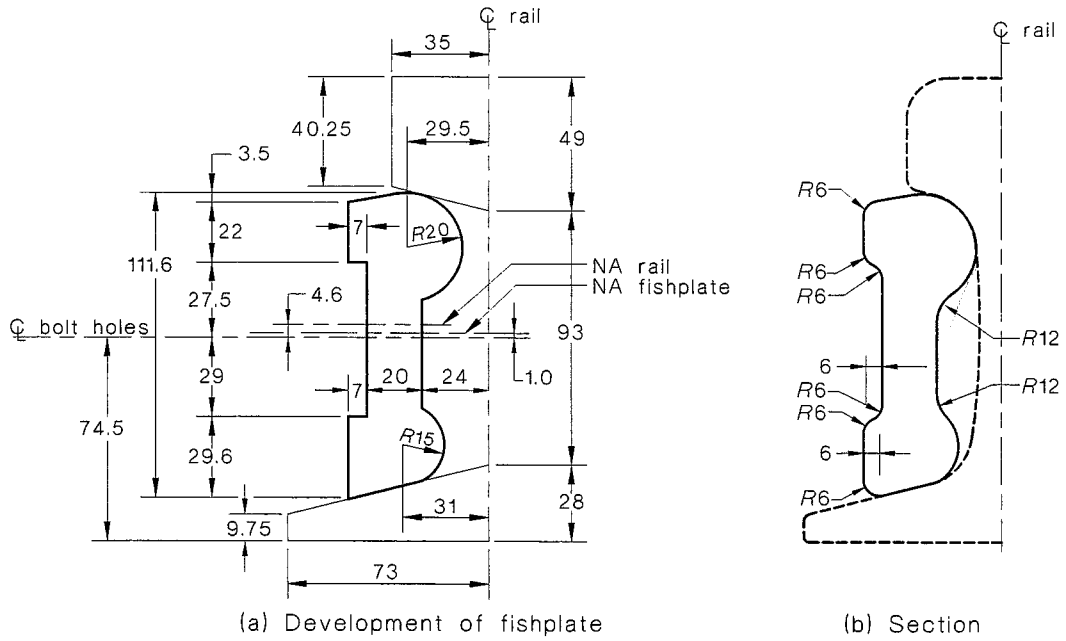
FIGURE B5 SECTION AND PUNCHING DETAILS OF BAR-TYPE (ROLLED) FISHPLATE FOR 53 kg/m RAIL



Area	3046 mm ²
Unit mass	23.90 kg/m
Second moment of area	3.37×10^6 mm ⁴
Section modulus head	64.72×10^3 mm ³
Section modulus base	57.33×10^3 mm ³

DIMENSIONS IN MILLIMETRES

FIGURE B6 SECTION AND PUNCHING DETAILS OF BAR-TYPE (ROLLED) FISHPLATE FOR 60 kg/m RAIL



Area	3046 mm ²
Unit mass	23.90 kg/m
Second moment of area	3.37×10^6 mm ⁴
Section modulus head	64.72×10^3 mm ³
Section modulus base	57.33×10^3 mm ³

DIMENSIONS IN MILLIMETRES

FIGURE B7 SECTION AND PUNCHING DETAILS OF BAR-TYPE (FORGED) FISHPLATE FOR 60 kg/m RAIL

APPENDIX C

MEANS OF DEMONSTRATING COMPLIANCE WITH THIS STANDARD

(Informative)

C1 SCOPE

This Appendix sets out the following different means by which compliance with this Standard can be demonstrated by the manufacturer or supplier:

- (a) Evaluation by means of statistical sampling.
- (b) The use of a product certification scheme.
- (c) Assurance using the acceptability of the supplier's quality system.
- (d) Other such means proposed by the manufacturer or supplier and acceptable to the customer.

C2 STATISTICAL SAMPLING

Statistical sampling is a procedure which enables decisions to be made about the quality of batches of items after inspecting or testing only a portion of those items. This procedure will only be valid if the sampling plan has been determined on a statistical basis and the following requirements are met:

- (a) The sample needs to be drawn randomly from a population of product of known history. The history needs to enable verification that the product was made from known materials at essentially the same time, by essentially the same processes and under essentially the same system of control.
- (b) For each different situation, a suitable sampling plan needs to be defined. A sampling plan for one manufacturer of given capability and product throughput may not be relevant to another manufacturer producing the same items.

In order for statistical sampling to be meaningful to the customer, the manufacturer or supplier needs to demonstrate how the above conditions have been satisfied. Sampling and the establishment of a sampling plan should be carried out in accordance with AS 1199, guidance to which is given in AS 1399.

C3 PRODUCT CERTIFICATION

The purpose of product certification is to provide independent assurance of the claim by the manufacturer that products comply with the stated Standard.

The certification scheme should meet the criteria described in HB 18.28 in that, as well as full type testing from independently sampled production and subsequent verification of conformance, it requires the manufacturer to maintain effective quality planning to control production.

The certification scheme serves to indicate that the products consistently conform to the requirements of the Standard.

C4 SUPPLIER'S QUALITY MANAGEMENT SYSTEM

Where the manufacturer or supplier can demonstrate an audited and registered quality management system complying with the requirements of the appropriate or stipulated Australian or international Standard for a supplier's quality management system or systems, this may provide the necessary confidence that the specified requirements will be met. The quality assurance requirements need to be agreed between the customer and supplier and should include a quality or inspection and test plan to ensure product conformity.

Information on establishing a quality management system is set out in AS/NZS ISO 9001 and AS/NZS ISO 9004.

C5 OTHER MEANS OF ASSESSMENT

If the above methods are considered inappropriate, compliance with the requirements of this Standard may be assessed from the results of testing coupled with the manufacturer's guarantee of product conformance.

Irrespective of acceptable quality levels (AQLs) or test frequencies, the responsibility remains with the manufacturer or supplier to supply products that conform to the full requirements of the Standard.

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